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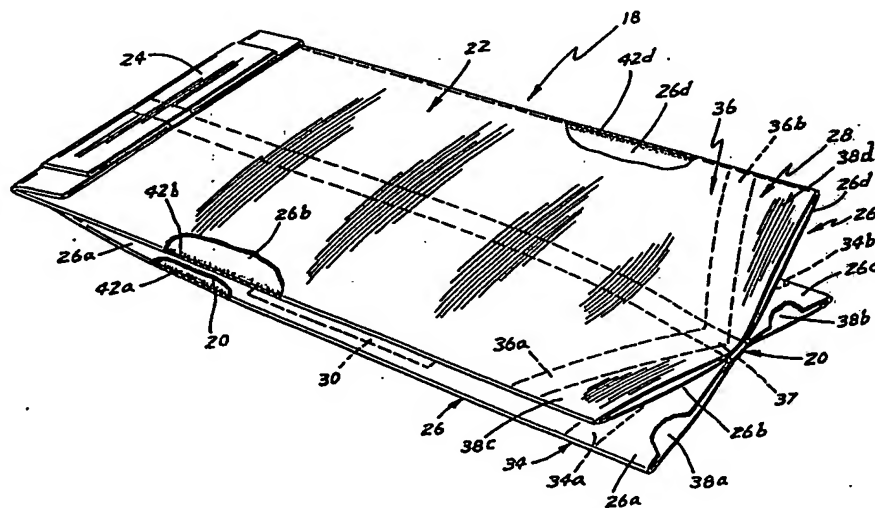
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(54) Title: SINGLE LAYER, GREASEPROOF, FLEXIBLE PAPER POPCORN PACKAGE

(57) Abstract

A package for use in microwave ovens is disclosed in its preferred form of a flexible, tubular bag (18) including expandable side walls (26) interconnected between bottom and top walls (20, 22), an openable end (28), and a permanent end wall (24). The side walls (26) include pleats (26a, 26b, 26c, 26d) which are folded in a collapsed condition of the bag (18) and expand due to internal expansion forces generated by the popping of kernels and the creation of water vapor. In a preferred form, the bag (18) is formed from a single layer of flexible, greaseproof paper of highly refined raw fibers of 100% chemical softwood pulp and having a basis weight in the order of 35 lb/ream.

The single layer of paper forming the bag (18) provides greaseproof properties in storage, transportation, and cooking throughout the thickness of the paper to prevent wicking and leaking of grease or oil through the single layer. The bag (18) in a preferred form includes grease protectors (42a, 42b, 42c, 42d) located inside of the bag (18) for sealing the bottom and top walls (20, 22) to the pleats (26a, 26b, 26c, 26d) adjacent to their respective connecting edges and in a most preferred form further includes grease protectors (44a, 44b) outside of the bag (18) for sealing the first and second pleats (26a, 26b) together and the third and fourth pleats (26c, 26d) together adjacent to their respective connecting edges. The grease protectors (42a, 42b, 42c, 42d, 44a, 44b) seal the surfaces of the bag (18) just above and adjacent the connecting edges to block the flow of grease to prevent grease wicking or leaking from the bag (18).



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1 SINGLE LAYER, GREASEPROOF, FLEXIBLE PAPER POPCORN PACKAGE
BACKGROUND

5 The present invention relates generally to packages
for use in microwave ovens, and pertains more
particularly to an expandable bag having protection from
grease leaking and/or wicking from its expansion creases
or folds and/or to a flexible popcorn package made from a
single layer of greaseproof paper.

10 When microwave popcorn packages were first introduced
utilizing a microwave susceptor, the packages typically
were formed by expandable paperboard containers and often
the load of the microwave popcorn popping package was
located in a plastic bag positioned inside of the

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1 paperboard container including the microwave susceptor.
The paperboard container in most instances was unfolded
into an expanded size by the consumer prior to popping of
the popcorn kernels in the microwave oven but in some
5 instances was unfolded by the popping of the popcorn
kernels, with the popped popcorn being served in the
expanded paperboard containers. Early packages suffered
from several disadvantages including the bulk of
expandable paperboard containers which increased the
10 amount of material required to make the container and
thus its cost, increased the size of the packaging and
storage requirements, as well as increased the amount of
material which had to be disposed of after the
consumption of the popcorn raising environmental
15 concerns. Further, the dynamics of expanding the
paperboard container and/or plastic bag by the forces
generated while popping the kernels were typically
insufficient to maximize the volume of the package which
in turn prevented the popcorn from popping with greater
20 volume. Also, plastic bags are susceptible to melting
and often are difficult to handle with a hot food product
at least due to the poor insulating qualities of plastic.
To avoid these and other problems and with the development
of microwave susceptors applied in the form of a thin
25 coating such as disclosed in U.S. Patent No. 4,267,420
issued to William A. Brastad, the microwave popcorn
industry has turned to popcorn packages formed from
flexible paper bags.

However, paper microwave popcorn popping bags
30 including microwave susceptors encountered different
types of problems. For example, the load of a microwave
popcorn popping package includes unpopped popcorn
kernels, a cooking oil or grease, salt, and other
ingredients such as colorings, flavorings, or the like.
35 It can be appreciated that during storage or
transportation of the filled microwave popcorn package by

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1 the processor, the marketing agencies, and the consumer,
the oil and/or grease have a tendency to leak from
flexible paper packages, especially at high temperatures,
causing aesthetically unpleasant appearances. Further,
5 during microwave popping, the oil and/or grease have a
tendency to wick from flexible paper packages. Current
flexible paper popcorn bags typically use a tri-laminate
of a greaseproof paper adhered to an outer fluorocarbon
treated, grease resistant paper with a microwave
10 susceptor sandwiched between. For example, the inner
layer could be formed of bleached greaseproof Kraft paper
of 25 lb./ream basis weight and the outer layer could be
formed of plain bleached Kraft paper of 30 lb./ream basis
weight. The two paper layers and the adhesive there-
15 between together provide the needed grease barrier in
both storage and/or transportation at high temperatures
as well as during microwave cooking. However, laminated
paper popcorn bags suffer from several disadvantages.
First, the paper bag has a great deal of stiffness
20 resulting from the multiple layers themselves but also
their adhesive interconnection. Stiffness detracts from
the ability of the bag to inflate or expand during
microwave popping of the popcorn which may in turn
detrimentally affect the volume of the popped kernels.
25 Also, the lamination of the materials requires extra
assembly costs and the amount of materials used for each
bag adds to the economic and environmental costs.

Thus, there is a need to reduce the amount of
material and/or layers utilized in the formation of
30 flexible paper popcorn packages including a microwave
susceptor. Current efforts in single ply paper bags
which have been unsuccessful prior to the present
invention involve common greaseproof paper in combination
with surface coatings of fluorocarbons, such as FC-807
35 made by 3M, Inc., St. Paul, Minnesota, or equivalent.
However, such efforts have not resulted in commercially

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1 successful packages as they do not provide adequate
greaseproof properties in storage, transportation, or
cooking throughout the paper. Further, when this paper
is creased such as at the corners in the pleats and
5 between the pleats and the top and bottom walls, fibers
in the paper and the coatings applied thereto fracture
and separate and reveal uncoated fiber ends which absorb
grease. Moreover, breaks or fractures might occur and
the oil and/or grease can leak out of the package.

10 Consequently, there is a continuing need for a
flexible paper popcorn package with reduced layers and
particularly formed of a single layer of flexible paper.

Further, as set forth above, the problem of grease
wicking and actual leaking is especially present at folds
15 and creases where the fibers of the paper and coatings
applied thereto for the greaseproofing characteristics
are fractured and/or separated. This problem has been
one of the major factors in limiting the amount that the
material and/or number of layers can be reduced in
20 flexible paper popcorn bags, as the mass and number of
layers of material are relied upon to provide the needed
grease barrier. Thus, a need exists for optionally
providing an added grease barrier at only those locations
especially at folds and creases where grease wicking and
25 leaking are a problem, with the added grease barrier
allowing minimization of the material and/or number of
layers at the remaining locations where grease wicking
and leaking are not such a problem.

Surprisingly, the above needs and other objectives
30 can be satisfied by providing a package in the form of a
bag including grease protectors for sealing the surfaces
of the walls of the bag adjacent to their connecting,
folding edges to prevent the grease or oil from leaking
or wicking from the interior volume of the bag.

35 In a preferred aspect, the package includes pleated,
expandable side walls, with the grease protectors located

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1 inside of the bag where the inside surfaces of the pleats overlie other inside surfaces of the bag and also located outside of the bag where the outside surfaces of the pleats overlie other outside surfaces of the bag.

5 In yet another preferred aspect of the present invention, the bag holds popcorn kernels and grease or oil for popping in a microwave oven, with the bag formed of a single layer of greaseproof paper having a thickness allowing the single layer to be flexed by the popping of
10 the popcorn kernels and also preventing the wicking and leaking of the grease or oil through the single layer.

The present invention will become clearer in light of the following detailed description of an illustrative embodiment of this invention described in connection with
15 the drawings.

Brief Description of the Drawings

The illustrative embodiment may best be described by reference to the accompanying drawings where:

Figure 1 shows a perspective view of a package
20 fabricated in accordance with the preferred teachings of the present invention in generally its collapsed, storage condition, but illustrated slightly expanded to show constructional details.

Figure 2 shows a top plan view of the package of
25 Figure 1, with portions broken away to show constructional details.

Figure 3 shows a perspective view of the package of Figure 1 in its expanded condition.

Figure 4 shows a cross-sectional view of the package
30 of Figure 1 in a condition slightly prior to its expanded condition of Figure 3.

All figures are drawn for ease of explanation of the basic teachings of the present invention only; the extensions of the Figures with respect to number, position,
35 relationship, and dimensions of the parts to form the preferred embodiment will be explained or will be within

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1 the skill of the art after the following teachings of the
present invention have been read and understood. Further,
the exact dimensions and dimensional proportions to
conform to specific force, weight, strength, and similar
5 requirements will likewise be within the skill of the art
after the following teachings of the present invention
have been read and understood.

Where used in the various figures of the drawings,
the same numerals designate the same or similar parts.
10 Furthermore, when the terms "top", "bottom", "first",
"second", "side", "end", and similar terms are used
herein, it should be understood that these terms have
reference only to the structure shown in the drawings as
it would appear to a person viewing the drawings and are
15 utilized only to facilitate describing the invention.

Description of the Preferred Embodiment

A package for use in microwave ovens according to the
preferred teachings of the present invention is shown as
an expandable, flexible bag in the drawings and generally
20 designated 18. It will facilitate the ensuing
description to consider bag 18 in the horizontal position
when placed in the microwave oven as opposed to a
vertical or upright position when the contents of bag 18
are being consumed by the consumer. Therefore, bag 18
25 includes a bottom wall 20, a top wall 22, an end wall 24,
side walls 26 and a closed end 28. In the preferred
form, the width of bottom wall 20 is less than the width
of top wall 22, although the widths of walls 20 and 22
could be equal.

30 End wall 24 provides a non-opening permanent seal to
the first end of bag 18. Particularly, the cross sectional
makeup of end wall 24 includes a number of folds that are
not important to an understanding of the present invention
so will not be specifically described, although end wall
35 24 should be constructed so as to seal adequately the
vapor created within bag 18 during the heating thereof in
the microwave oven. In the preferred form of the present

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1 invention, end wall 24 is shown as being of the type
shown in U.S. Patent No. 4,973,810 and is formed by
folding the first ends of bottom, top, and side walls 20,
22, and 26 over top wall 22. Alternatively, end wall 24
5 can have a flat rectangular or square configuration, with
such bags being commonly referred to as square bottom
bags in the trade. Further, bag 18 can optionally
include the non-heated flap of the type shown and
described in U.S. Patent No. 4,864,090. However, it
10 should be appreciated that end wall 24 can be a variety
of types and configurations such as but not limited to
the types shown in U.S. Patent Nos. 3,973,045; 4,450,180;
4,691,374; and 5,044,777.

In the most preferred form, side walls 26 include
15 gussets or pleats 26a, 26b, 26c and 26d that enable side
walls 26 to expand during a heating cycle. Particularly,
in the preferred form, pleats 26a and 26b are connected
together at first edges and have second and third,
opposite edges connected to bottom wall 20 and top wall
20 22, respectively. Likewise, pleats 26c and 26d are
connected together at fourth edges and have fifth and
sixth, opposite edges connected to bottom wall 20 and top
wall 22, respectively. In the preferred form, in its
collapsed condition, pleats 26a and 26c have the same
25 width and overlie bottom wall 20, and pleats 26b and 26d
have the same width which is greater than the width of
pleats 26a and 26c and overlie pleats 26a and 26c, with
top wall 22 overlying pleats 26b and 26d. In the
preferred form, bottom and top walls 20 and 22 have a
30 width extending beyond the interconnections of pleats 26a
and 26b and of pleats 26c and 26d when bag 18 is in its
collapsed condition. The second, free ends of pleats
26a, 26b, 26c and 26d forming side walls 26, of bottom
wall 20, and of top wall 22 are co-planar, and have the
35 same extent or length from end wall 24.

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1 End 28 provides a peelable closure seal which fails
during microwave cooking adjacent the second, free ends
of bottom, top and side walls 20, 22, and 26 or in other
words, adjacent the second end of bag 18. This peelable
5 seal failure allows trapped steam to vent from the
package, as well as allowing the consumer to open bag 18
after microwave cooking and prior to eating. In the most
preferred form, end 28 is formed in a manner as shown and
described in U.S. Patent Application No. 07/834,187 filed
10 February 2, 1992, which is hereby incorporated herein by
reference, and includes first and second V-shaped adhesive
strips 34 and 36. Strip 34 is located on bottom wall 20
having first and second, straight legs 34a and 34b
interconnected by their first ends at an angle in the
15 order of 140° and having their second ends extending to
the interconnection of pleats 26a and 26c to bottom wall
20, respectively. Strip 36 overlies strip 34 and is
located on top wall 22 having first and second, straight
legs 36a and 36b interconnected by their first ends at an
20 angle in the order of 140° and having their second ends
extending to the interconnection of pleats 26b and 26d to
top wall 22, respectively. The distance or spacing of
the second ends of legs 34a, 34b, 36a, and 36b from the
second, free ends of walls 20, 22, and 26 is greater
25 than the distance or spacing of the first ends and
intersections of legs 34a, 34b, 36a, and 36b from the
second, free ends of walls 20, 22, and 26. It can then
be appreciated that leg 34a adheres and seals pleat 26a
to bottom wall 20, leg 34b adheres and seals pleat 26c to
30 bottom wall 20, leg 36a adheres and seals pleat 26b to
top wall 22, and leg 36b adheres and seals pleat 26d to
top wall 22. Further, strips 34 and 36 adhere and seal
bottom wall 20 to top wall 22 at their central portions
37 intermediate the interconnections of pleats 26a and
35 26b and of pleats 26c and 26d.

Areas 38a, 38b, 38c and 38d are formed and defined by
the material between the free ends of walls 20, 22, and 26

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1 and strips 34 and 36 and located on the opposite side of
strips 34 and 36 forming the peelable seal than end 24,
with areas 38a, 38b, 38c, and 38d being free of adhesive
and unsealed in the preferred form. Due to the angular
5 orientation of legs 34a, 34b, 36a, and 36b, areas 38a,
38b, 38c, and 38d are of a triangular configuration.
Further, since the first ends of legs 34a, 34b, 36a, and
36b are located in the central portions 37 of bottom and
top walls 20 and 22 having widths extending beyond pleats
10 26a, 26b, 26c, and 26d and since legs 34a, 34b, 36a and
36b extend therefrom in a linear manner at an obtuse
angle to the opposite edges of pleats 26a, 26b, 26c, and
26d, areas 38a, 38b, 38c, and 38d are of a large size for
grasping by the consumer and specifically are considerably
15 larger than flaps formed by adhesive extending at small
angles relative to each other and only through the pleats
such as when a box-like shape is desired as disclosed in
U.S. Patent 5,044,777.

However, it should be appreciated that end 28 can be
20 a variety of types and configurations according to
preferred aspects of the present invention such as but
not limited to the types shown in U.S. Patent Nos.
3,973,045; 4,450,180; 4,691,374; 4,864,090; 4,973,810;
and 5,044,777.

25 Attention is now directed to a susceptor pad 30 that
extends over a portion of bottom wall 20 spaced from end
wall 24 and end 28. Susceptor pad 30 can be formed in
any suitable manner known in the art such as a metalized
plastic film adhered to bottom wall 20, as a paper backed
30 susceptor, or as a coating applied or printed to bottom
wall 20. Further, although susceptor pad 30 is shown as
overlying bottom wall 20 and thus located inside of bag
18, susceptor pad 30 can be located outside of bag 18
with bottom wall 20 overlying susceptor pad 30. Further,
35 placement of susceptor pad 30 can occur at the material
converter or on the manufacturing lines.

It can then be appreciated that bag 18 can be
manufactured as current bags are manufactured for example

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1 of the type shown and described in U.S. Patent Nos.
4,450,180; 4,735,513; 4,878,765; 4,691,374; or 5,044,777.
In this regard, bag 18 can be formed by cutting a web of
material to length, folding that length of material to
5 form the tubular bag stock including bottom, top, and
side walls 20, 22, and 26, and then forming end wall 24
by folding and adhering bottom, top and side walls 20, 22,
and 26. It should be noted that the overlapping edges of
the web of material forming the tubular bag stock has
10 been omitted in Figures 1-3 for ease of illustration.
It should also be noted that the free, second ends of
bottom, top, and side walls 20, 22, and 26 are all of the
same length and specifically do not require any special
cuts and/or do not require extra components to form tabs
15 or flaps.

It can further be appreciated that bag 18 can be
filled with the desired food product as current bags are
filled for example of the type shown and described in
U.S. Patent 4,450,180. After filling, strips 34 and 36
20 can be adhered to walls 20, 22, and 26 utilizing standard
equipment presently utilized to form the peelable seal of
current bags. It of course should be appreciated that
the particular manner of manufacture and filling of bag
18 can be done in a variety of ways and manners such as
25 but not limited to the example set forth above.

For the sake of completeness, it will be assumed
that the contents of bag 18 are popcorn kernels and the
popped kernels have been generally indicated by the
reference numeral 40, having been popped when in the
30 microwave oven. Particularly, as with current bags, bag
18 in a collapsed condition is placed in a microwave oven
with bottom wall 20 resting upon the bottom surface of
the oven cavity. When subjected to microwave energy,
susceptor pad 30 converts microwave energy into heat,
35 with the heat and remaining microwave energy causing the
popping of the kernels and the creation of water vapor.
The water vapor and heated air cause side walls 26 to

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1 expand to extend from their connecting edges at an
angular relation to each other and the inside surfaces of
pleats 26a, 26b, 26c, and 26d being spaced from the inside
surfaces of bottom and top walls 20 and 22, expanding bag
5 18 and increasing the interior volume inside of bag 18
for popped kernels 40. It can then be appreciated that
due to its flexible nature, bag 18 will expand to a
football like shape, including separating pleats 26a and
26b and pleats 26c and 26d adjacent to the second ends of
10 bottom, top and side walls 20, 22, and 26.

According to the most preferred teachings of the
present invention, bag 18 is formed of a single layer of
greaseproof paper having a thickness allowing the single
layer to be flexed by the popping of the popcorn kernels
15 and also providing adequate greaseproof properties in
storage, transportation, or cooking throughout the
thickness of the paper to prevent wicking and leaking of
grease or oil through the single layer. It has been
discovered that by the selection of raw fibers as well as
20 highly refining the raw fibers in the process of making
the paper, the fibers themselves in the paper are
resistant to grease staining and gives the paper
greaseproof properties even when folded or creased.
Particularly, the highly refined fibers have less
25 tendency to fracture revealing uncoated fiber ends which
absorb grease, but rather the bonds between the fibers
tend to stretch, bend, or fracture and thus not revealing
fractured fiber ends. Specifically raw fibers selected
from the group of 100% chemical softwood pulp such as
30 100% bleached Kraft softwoods and which are highly
refined to a freeness level in the order of 150 to 250
cubic centimeters have been found to provide adequate
greaseproof properties when formed into paper having a
basis weight of 25 lb./ream to 45 lb./ream and in the
35 most preferred form in the order of 35 lb./ream. In the
most preferred form, bag 18 is formed of a single layer
of paper, Code No. 220-3510 produced by Rhineland Paper
Company, 515 W. Davenport Street, Rhineland, Wisconsin
54501.

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1 Consequently, with the foregoing description in mind,
it should now be apparent that bag 18 according to the
teachings of the present invention is much more flexible
than current conventional popcorn bags because of its
5 single layer and elimination of the laminating adhesive.
Further, benefits of the single layer of paper softening
during microwave cooking due to heat and steam give bag
18 more flexibility and less stiffness. Due to this
increased flexibility, bag 18 according to the preferred
10 teachings of the present invention inflates or expands
from its collapsed, storage condition to an inflated or
expanded condition having a larger interior volume than
the same size current conventional popcorn bags, with bag
18 of the present invention allowing the popped kernels
15 to pop with greater volume.

It can further be appreciated that the single
layer forming bag 18 according to the teachings of the
present invention provides economic advantages over
current multilaminate popcorn bags by reducing the amount
20 of paper material used for each bag 18 and also by
eliminating the adhesive and the laminating steps
required in multilaminate popcorn bags. Additionally,
with the reduction in the amount of paper material used
for each bag 18 and the elimination of the laminating
25 adhesive, less package material in the form of garbage
after the consumption of the popcorn is required to be
disposed of resulting in environmental advantages over
multilaminate popcorn bags.

When the amount of paper material utilized in the
30 formation of bags 18 is minimized, whether of a
multilaminate and especially of a single-ply construction,
the consistent prevention of grease wicking and actual
leaking in the fold or creased areas is a problem. Bag
18 according to the most preferred teachings of the
35 present invention provides an added option of provisions
for built-in grease leak protection at the creases.
Particularly, in the most preferred form, grease
protectors 42a, 42b, 42c, and 42d are provided located

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1 inside of bag 18 for sealing bottom wall 20 to pleat 26a,
top wall 22 to pleat 26b, bottom wall 20 to pleat 26c,
and top wall 22 to pleat 26d, respectively, adjacent to
their respective connecting edges, with grease protectors
5 42a, 42b, 42c, and 42d sticking or joining the inside
surfaces of bottom wall 20 to pleat 26a, top wall 22 to
pleat 26b, bottom wall 20 to pleat 26c, and top wall 22
to pleat 26d, respectively, together adjacent to their
respective connecting edges. Further, in the most
10 preferred form, grease protectors 44a and 44b are
provided located outside of bag 18 for sealing pleat 26a
to pleat 26b and pleat 26c to pleat 26d, respectively,
adjacent to their respective connecting edges, with
grease protectors 44a and 44b sticking or joining the
15 outside surfaces of pleat 26a to pleat 26b and pleat 26c
to pleat 26d, respectively, together adjacent to their
respective connecting edges. In the most preferred form,
grease protectors 42a, 42b, 42c, 42d, 44a and 44b are
applied during the printing process in the form of strips
20 of preapplied heat seal adhesive on one or both sides of
the connecting edges or of strips of preapplied cohesive
on both sides of the connecting edges, such as Duraset 12,
or equivalent.

Grease protectors 42a, 42b, 42c, 42d, 44a and 44b
25 are selected to actually seal the paper forming bag 18
together just above and adjacent the connecting edges.
Grease protectors 42a, 42b, 42c, and 42d actually block
the flow of grease to the folded or creased areas of the
connecting edges, and grease protectors 44a and 44b block
30 the flow of grease away from the folded or creased areas
of the connecting edges, thus preventing grease wicking
or leaking. Further, in the preferred form, the adhesive
or cohesive forming grease protectors 42a, 42b, 42c, 42d,
44a and 44b is selected to release or peel during
35 expansion or inflation of bag 18 during microwave cooking
such that the expanded or inflated volume of bag 18 will

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1 not be reduced utilizing grease protectors 42a, 42b, 42c,
42d, 44a and 44b from the expanded or inflated volume of
bag 18 not utilizing grease protectors 42a, 42b, 42c,
42d, 44a and 44b.

5 It can then be appreciated that grease protectors
42a, 42b, 42c, 42d, 44a and 44b according to the
teachings of the present invention provide an added
grease barrier at the folded and creased areas where
grease wicking and leaking are especially a problem,
10 with grease protectors 42a, 42b, 42c, 42d, 44a, and 44b
allowing minimization of the material and/or number of
layers forming bag 18 where grease wicking and leaking
are not such a problem.

Thus since the invention disclosed herein may be
15 embodied in other specific forms without departing from
the spirit or general characteristics thereof, some of
which forms have been indicated, the embodiments
described herein are to be considered in all respects
illustrative and not restrictive. The scope of the
20 invention is to be indicated by the appended claims,
rather than by the foregoing description, and all changes
which come within the meaning and range of equivalency of
the claims are intended to be embraced therein.

What is claimed is:

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1. Expandable, paper, popcorn package for holding popcorn kernels and grease or oil for popping in a microwave oven comprising, in combination: a bag having an interior volume and a closed end openable by the consumer after microwave cooking; and susceptor means for converting microwave energy into heat extending over a portion of the bag, with the popcorn kernels and the grease or oil generally overlying the susceptor means during microwave cooking; and wherein the bag is formed of a single layer of greaseproof paper having a thickness allowing the single layer to be flexed by the popping of the popcorn kernels and also preventing the wicking and leaking of the grease or oil through the single layer.

2. The popcorn package of claim 1 wherein the greaseproof paper is formed of raw fibers which are highly refined.

3. The popcorn package of claim 2 wherein the single layer has a basis weight in the order of 35 lb./ream.

4. The popcorn package of claim 3 wherein the raw fibers are selected from the group of 100% chemical softwood pulps.

5. The popcorn package of claim 1 wherein the greaseproof paper is formed of raw fibers selected from the group of 100% chemical softwood pulps.

6. Package for holding a food product including grease or oil and for heating in a microwave oven comprising, in combination: a flexible bag including a bottom wall, a top wall, and at least a first side wall extending between the top and bottom walls, with the top, bottom and side walls including first and second ends, with the first side wall including first and second pleats with the pleats being connected together at first edges and with the first pleat having a second, opposite edge connected to the bottom wall and the second pleat having a third, opposite edge connected to the top wall, with the bag further including an end wall at the first ends of the top, bottom and side walls; susceptor means

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for converting microwave energy into heat extending over a portion of the bottom wall spaced from the first and second ends of the bottom wall; means for closing the second ends of the top, bottom, and side walls and for allowing the consumer to open the package after microwave cooking; and means inside of the bag for sealing the first pleat to the bottom wall adjacent to the second edge; means inside of the bag for sealing the second pleat to the top wall adjacent to the third edge, with the sealing means preventing the grease or oil from leaking or wicking from inside the bag through the edges.

7. The package of claim 6 wherein the sealing means are peelable during microwave cooking.

8. The package of claim 7 wherein the sealing means comprise adhesive or cohesive applied adjacent to the edges.

9. The package of claim 8 wherein the bottom, top, and side walls are of paper having a thickness allowing the paper to be flexed by the microwave cooking of the food product.

10. The package of claim 9 wherein the bottom, top, and side walls are formed of a single layer of greaseproof paper which prevents wicking and leaking of the grease or oil through the single layer.

11. The package of claim 10 wherein the greaseproof paper is formed of raw fibers selected from the group of 100% chemical softwood pulp and which are highly refined, and having a basis weight in a range of about 25 lb./ream to 45 lb./ream.

12. The package of claim 8 wherein the bag includes a second side wall extending between the top and bottom walls opposite to the first side wall, with the second side wall including at least third and fourth pleats, with the third and fourth pleats being connected together at fourth edges and with the third pleat having a fifth, opposite edge connected to the bottom wall and the fourth pleat having a sixth, opposite edge connected to the top

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wall; means inside of the bag for sealing the third pleat to the bottom wall adjacent to the fifth edge; means inside of the bag for sealing the fourth pleat to the top wall adjacent to the sixth edge; and means outside of the bag for sealing the third pleat to the fourth pleat adjacent to the fourth edges.

13. The package of claim 6 further comprising, in combination: means outside of the bag for sealing the first pleat to the second pleat adjacent to the first edges.

14. Package for holding a food product including grease or oil comprising, in combination: an expandable bag having an interior volume for holding the food product and the grease or oil and including at least first and second walls connected together at first edges, with each of the first and second walls having first and second surfaces, with the bag having a collapsed condition and an expanded condition, with the interior volume of the bag increasing as the bag expands from the collapsed condition to the expanded condition, with the first and second walls being folded about the first edges with the first surfaces overlying each other in the collapsed condition, with the first and second walls extending from the first edges at an angular relation to each with the first surfaces being spaced from each other in the expanded condition; and means for sealing the first surfaces together adjacent to the first edges to prevent the grease or oil from leaking or wicking from the interior volume of the bag.

15. The package of claim 14 wherein the sealing means is peelable as the bag expands from the collapsed condition to the expanded condition.

16. The package of claim 15 wherein the sealing means comprise adhesive or cohesive applied to one or both of the first surfaces of the first and second walls adjacent to the first edges.

17. The package of claim 15 wherein the first

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surfaces are inside of the bag.

18. The package of claim 15 wherein the first surfaces are outside of the bag.

19. The package of claim 15 wherein the bag is sealed, wherein the bag expands from the collapsed condition to the expanded condition during cooking of the food product including the grease or oil.

20. The package of claim 14 wherein the first and second walls have a flexibility allowing flexing of the first and second walls by the microwave cooking of the food product.

21. The package of claim 20 wherein the first and second walls are formed of a single layer of greaseproof paper which prevents wicking and leaking of the grease or oil through the single layer.

22. The package of claim 21 wherein the greaseproof paper is formed of raw fibers selected from the group of 100% chemical softwood pulp and which are highly refined, and having a basis weight in a range of about 25 lb./ream to 45 lb./ream.

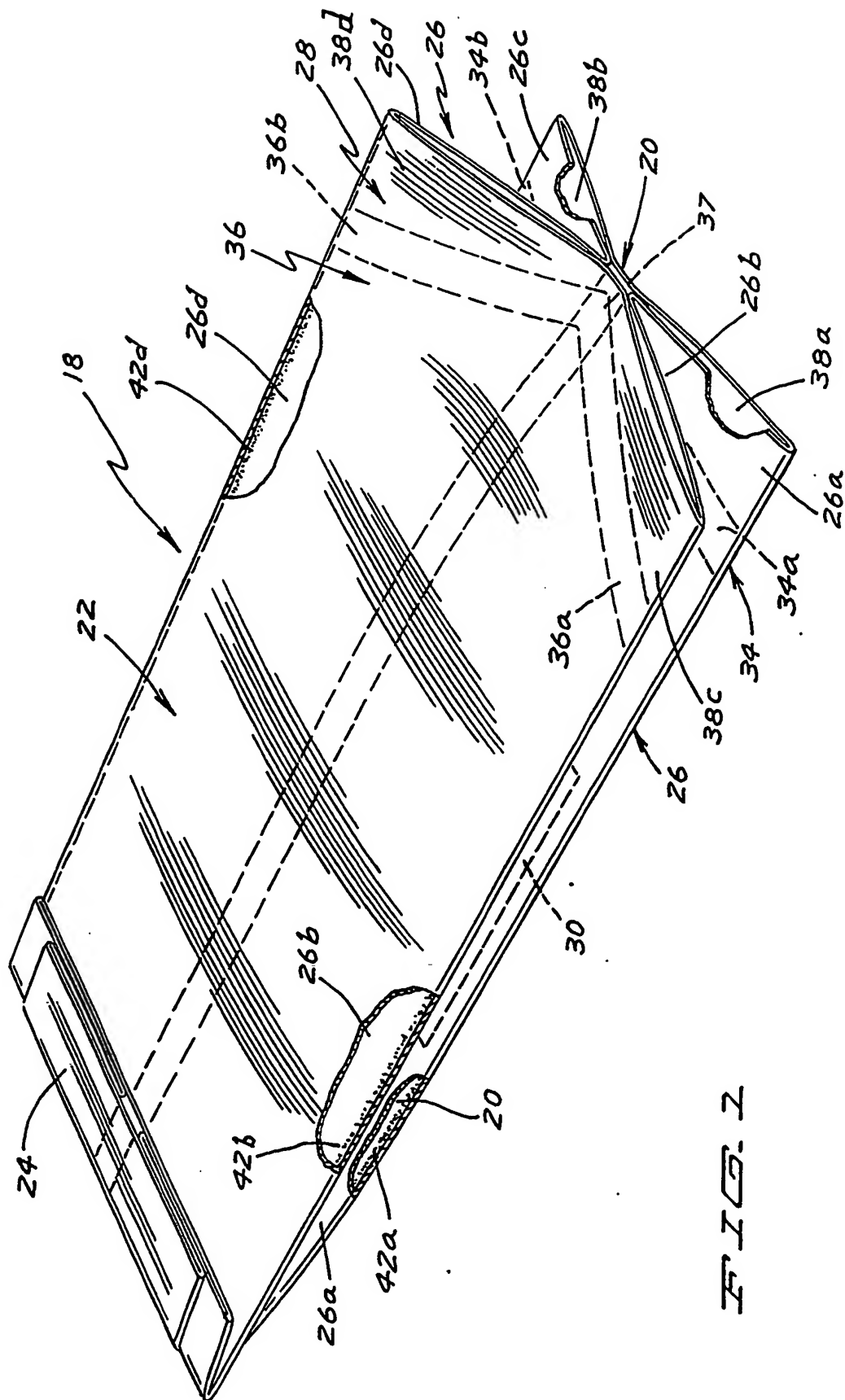


FIG. 1

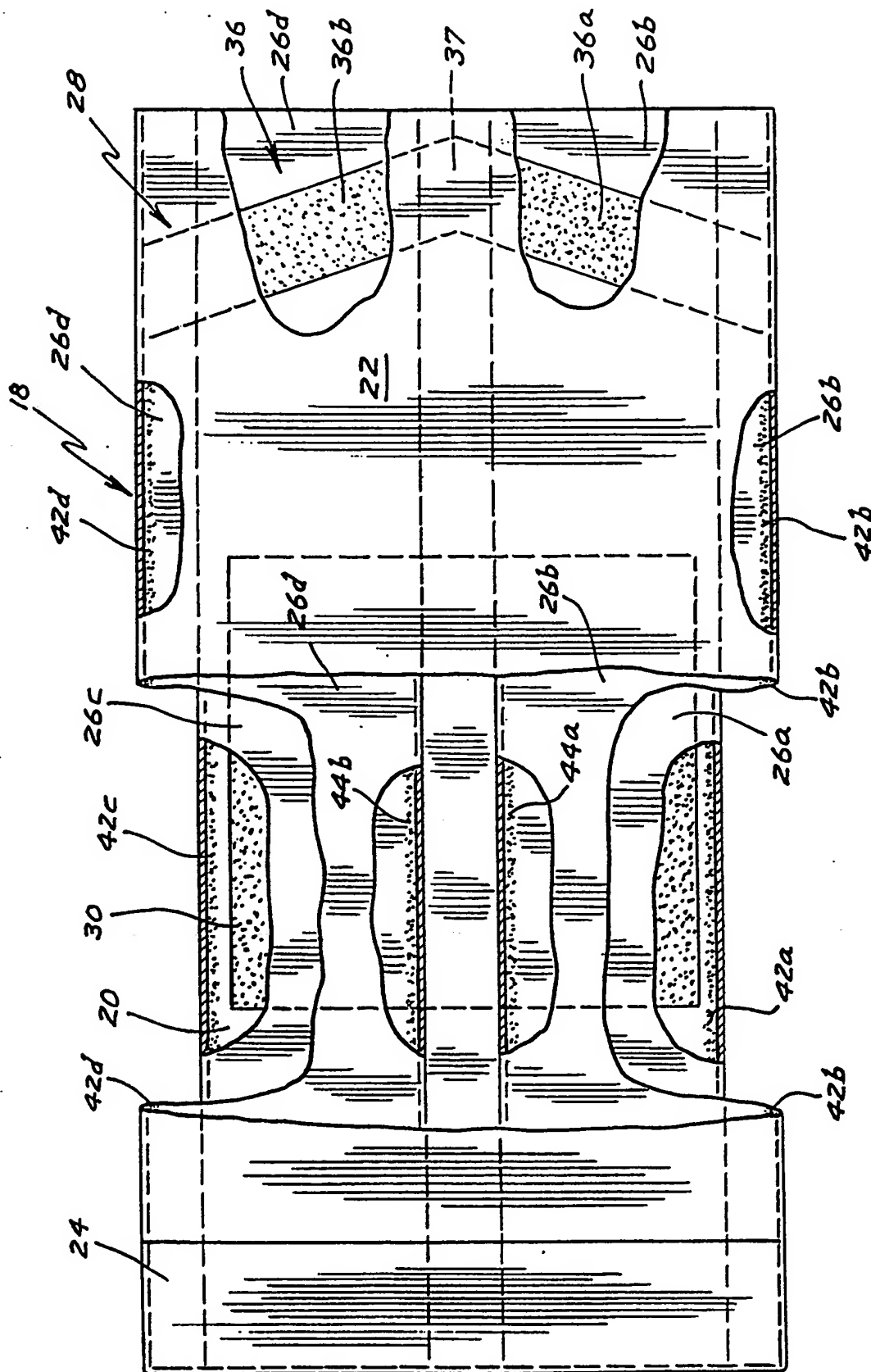


FIG. 2

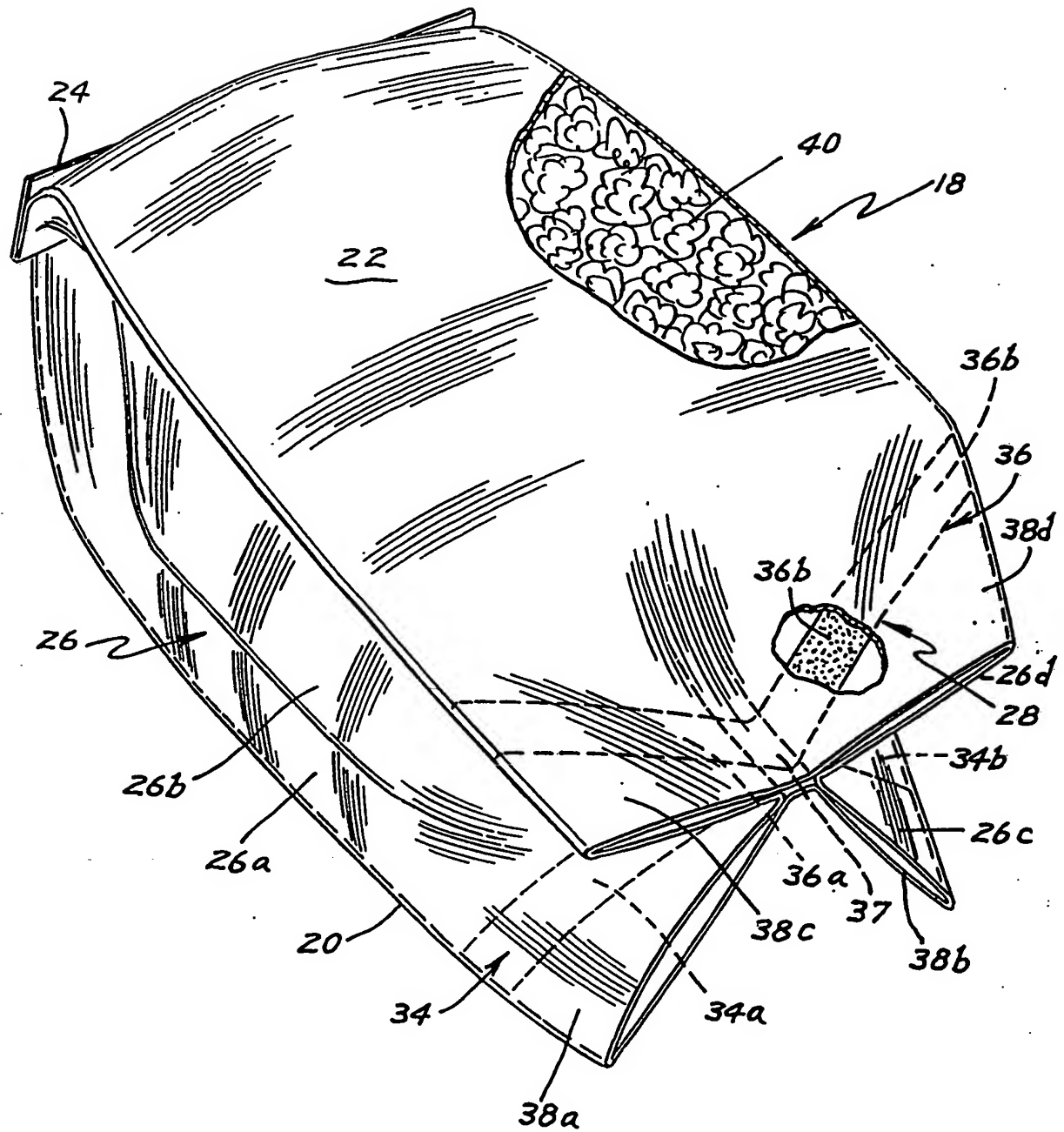
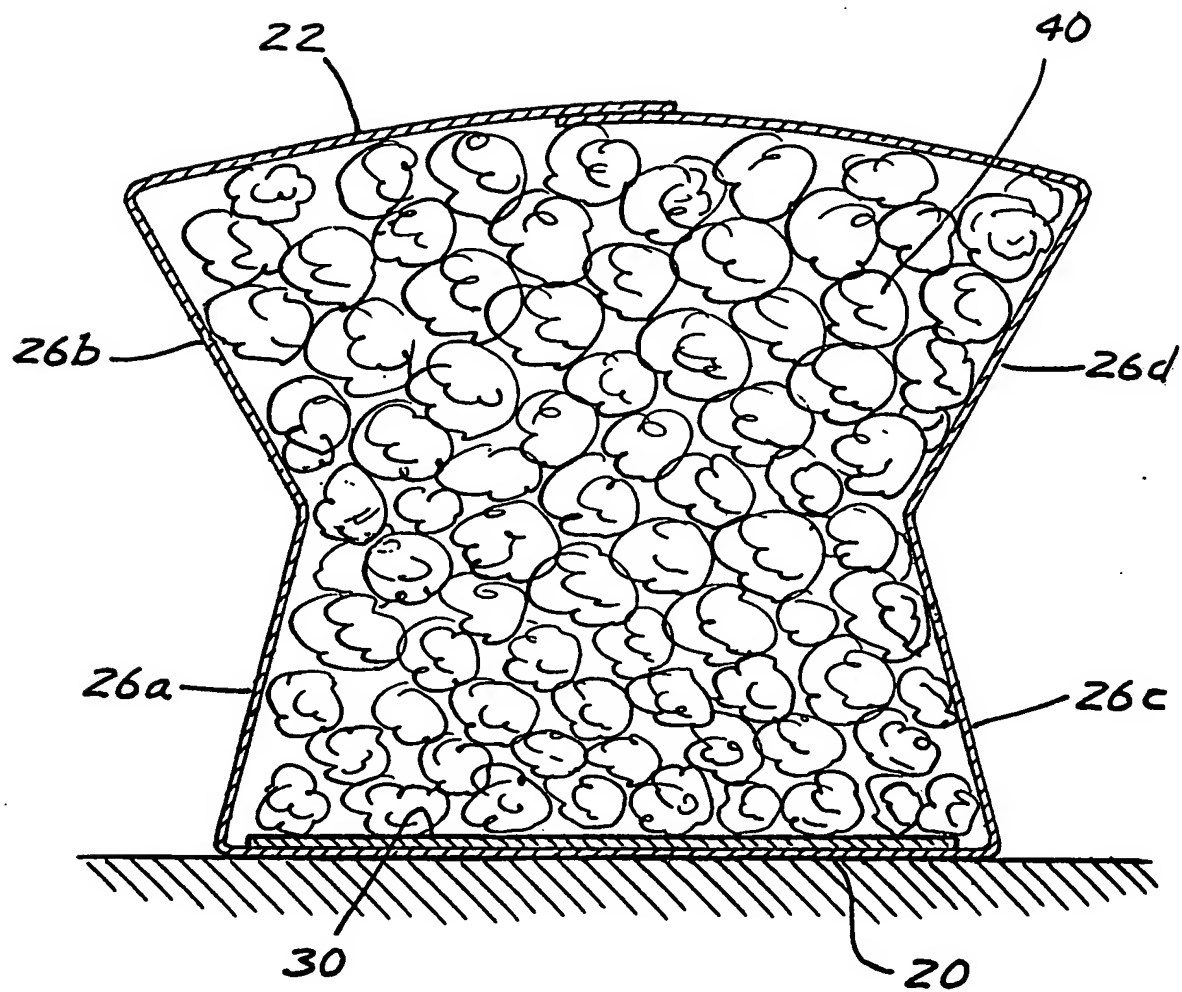


FIG. 3

*FIG. 4*

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 B65D81/34		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. 5	B65D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X,P	WO,A,9 222 475 (HUNT-WESSON INC.) 23 December 1992	1-3,6
Y	see page 6, line 23 - page 9, line 34; figures 1-6	7-10, 12-21
Y	---	
X	US,A,5 044 777 (WATKINS ET AL.) 3 September 1991 see column 2, line 53 - column 3, line 54 see column 5, line 56 - column 6, line 5; figures 1,2,7-10	7-10, 12-21 6
A	---	
	US,A,4 571 337 (J. CAGE) 18 February 1986 see column 3, line 3 - line 51; figures 1-4,6-8	1-21

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<p>¹⁰ Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
13 MAY 1993	25. 05. 93	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	PERNICE C.	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4 038 425 (L. BRANDBERG) 26 July 1977 see column 3, line 28 - line 38; figures 1,8-10 see column 5, line 12 - line 45 ---	1-21
A	US,A,4 892 744 (J. YLVISAKER) 9 January 1990 see column 8, line 61 - column 9, line 20 see column 4, line 12 - line 61; figure 1 ---	1-21
A	DATABASE WPI Week 8034, 5 August 1980 Derwent Publications Ltd., London, GB; AN 80-58795C & CA,A,1 082 859 (DOMTAR INC.) 5 August 1980 see abstract -----	4,5,11, 22

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

US 9300849
SA 70116

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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13/05/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A-9222475	23-12-92	None	
US-A-5044777	03-09-91	AU-A- 8413191	26-05-92
		CN-A- 1060823	06-05-92
		WO-A- 9207776	14-05-92
		US-A- 5195829	23-03-93
US-A-4571337	18-02-86	CA-A- 1238609	28-06-88
		JP-C- 1612135	30-07-91
		JP-B- 2038467	30-08-90
		JP-A- 60240675	29-11-85
US-A-4038425	26-07-77	None	
US-A-4892744	09-01-90	US-A- 4927648	22-05-90
		US-A- 4942050	17-07-90